

# Copeland Scroll™

ZX condensing unit for refrigeration applications



User Manual

**Copeland Scroll™**

  
**EMERSON™**  
Climate Technologies

## About Emerson Climate Technologies

Emerson Climate Technologies, a business segment of Emerson, is the world's leading provider of heating, air conditioning and refrigeration solutions for residential, industrial and commercial applications. The group combines best-in-class technology with proven engineering, design, distribution, educational and monitoring services to provide customized, integrated climate-control solutions for customers worldwide. Emerson Climate Technologies' innovative solutions, which include industry-leading brands such as Copeland Scroll and White-Rodgers, improve human comfort, safeguard food and protect the environment. For more information, visit [EmersonClimateAsia.com](http://EmersonClimateAsia.com).

## Our Vision

Emerson Climate Technologies, With Our Partners,  
Will Provide Global Solutions To Improve Human Comfort,  
Safeguard Food And Protect The Environment.

*Emerson Climate Technologies is pleased to offer the ZX platform refrigeration condensing units (CDU) specifically designed for medium temperature (ZX-MT & ZXB-MT), digital modulated variable capacity medium temperature (ZXD) and low temperature (ZXL-LT) refrigeration.*

*ZX series CDU has been highly successful in the Asian market and enjoys proven success with its energy savings and customer-friendly electronic features.*



# Table of Contents

<b>Disclaimer</b>	04
<b>Features and Benefits</b>	04
<b>Nomenclature</b>	05
<b>Bill of Material</b>	05
<b>Physical Layout of the Unit</b>	06
<b>Product Specification</b>	
Qualified Refrigerants And Oils	07
E2 Control Board - Rotary Switch And Dip Switch Setting (ZX-MT, ZXB-MT & ZXL-LT)	08
Defrost Module Function Set	09
Digital Scroll Controller (ZXD)	09
ZX CDU Intelligent Store Solution Module	10
<b>Installation</b>	
Condensing Unit Handling	14
Electrical Connection	14
Refrigeration Piping Installation	15
Expansion Valve Selection for Low Ambient Application	16
Location and Fixing	16
<b>Start Up and Operation</b>	17
<b>Diagnostic Initialization Message (ZX-MT, ZXB-MT &amp; ZXL-LT)</b>	17
<b>Diagnostic Messaging - LED Definition (ZX-MT, ZXB-MT &amp; ZXL-LT)</b>	18
<b>Alarm Messaging - Digital Scroll Controller (ZXD)</b>	18
<b>Wiring Diagram</b>	19
<b>Contact Lists</b>	28

# ZX Platform CDU

## Disclaimer

Thank you for purchasing the ZX platform condensing unit from Emerson Climate Technologies. ZX platform CDUs are the best in class within the capacity and operating range available in the market. ZX CDU is designed to operate reliably and to deliver high operating efficiencies in medium and low temperature refrigeration applications. It also provides constant monitoring of the compressor operating conditions and displays the running or fault conditions of the CDU. ZX platform CDUs have to be installed by following the industry trade practices for its safe and reliable operation. It is assumed that the CDU is selected, installed and serviced only by professionals. The user manual does not cover good industry practices which are essential on a refrigeration equipment installation. No responsibility can be accepted for damage caused by inexperienced or inadequately trained site technicians or improper installation design.

If in doubt, please consult your local sales office, quoting unit model and serial number as shown on each unit nameplate. In case of any ambiguity, the wiring diagram supplied with each unit takes precedence over the diagram in this manual.

## Introduction to ZX Platform CDU

**ZX** medium temperature, **ZXB** medium temperature, **ZXD** digital medium temperature and **ZXL** low temperature series have been highly successful in the Asian market and enjoys proven success with its energy savings and customer-friendly electronic features. ZX, ZXB, ZXD and ZXL CDUs have been applied by several well known end-users and chain retailers throughout Asia. The ZX platform is also gaining wider acceptance in the global market and specific variants have been developed and exported to the USA and to the European and Middle East markets.

## Receiving your unit

All units are shipped with a holding charge of dry nitrogen inside at a low but positive pressure. Suitable labeling is prominently displayed on both the unit and the packaging. Service connectors are provided on the CDU service valve for the convenient checking of the integrity of the holding charge.

**Caution!** It is very important to check that this holding pressure exists at the time you receive each unit from us or our authorized representatives. Please inform us or our authorized representative if the holding charge is non-existent. Failure to do so could void the claim for other related system faults at a later period.

Transit damage is essentially an insurance claim and is not covered under manufacturing defect. It is also advisable to inspect the rest of the unit for obvious physical damage and inform us or our authorized representative in case any is discovered.

## ZX Platform Condensing Unit was designed based on three factors demanded by industry users:

**Intelligent Store Solutions** - A most innovative approach to enterprise facility management, Emerson's Intelligent Store™ architecture integrates hardware and services, to provide retailers a single view into their entire network of facilities and understanding what facilities actually cost to operate and maintain.

The Intelligent Store architecture transforms data from store equipment and controls into actionable insights. Designed to deliver value in both new and existing stores, Emerson aims to help the retailers:

- Make better decisions on recourses investment for greatest impact
- Gain accurate feedback and customized service to your specific needs
- Reduce operational costs and boost the profitability at most convenience

**Energy Efficiency** - Utilizing Copeland Scroll™ compressor technology, variable speed fan motor, large capacity condenser coil and advanced control algorithms, energy consumption is significantly reduced. End-users can save more than 20% on annual energy costs rather than using hermetic reciprocating units.

**Reliability** - Combining the proven reliability of Copeland Scroll™ compressors with advanced electronics controller and diagnostics, equipment reliability is greatly enhanced. Fault code alerts and fault code retrieval capabilities provide information to help improve speed and accuracy of system diagnostics. Integrated electronics provide protection against over-current, over-heating, incorrect phase rotation, compressor cycling, high pressure resets, low pressure cut-outs. It can also send out a warning message to an operator when there is a liquid floodback, which can prevent critical damage on the unit.

Intelligent Store	➡	Better Decision Making
Highest Efficiency	➡	Lower Energy Bills
Reliability	➡	Lower Maintenance Cost

### ZXD Family



- Capacity modulation to control precise room temperature and humidity
- With real time monitoring of compressor operating conditions

### ZX, ZXB and ZXL Family

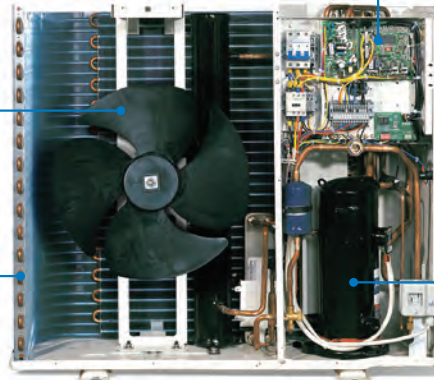
Proprietary Electronic Algorithms Present Advantage On Diagnose, Communication, and Protection Purposes. They Are Also Fundamental to Control Fan Speed, Optimizing Energy Performance for Local Seasonal Ambient Temperatures



- Compressor Reverse Rotation
- Compressor Over Current
- Compressor Internal Motor Protector Trip
- Discharge Gas Over Heat
- High Pressure Cut Out
- Low Pressure Cut Out (only on MT series)
- Refrigerant Flood Back
- Compressor Minimum Off Time
- Internal Thermal Sensor Failure
- Intelligent Store Solution: Communication and Retail Store Monitoring

Variable Speed Fan Motor and High Efficiency Fan Blade

Oversized Condenser Coil for Maximum Heat Transfer



Copeland Scroll Compressor Technology – High Efficiency, Ultra Quiet, High Reliability

Figure 1. ZX Platform CDU Features

## Nomenclature

Z	X	L	0	2	0	E	-	T	F	D	-	4	5	1
Unit Family	Blank = Medium Temp B = Medium Temp (R134a) D = Digital Medium Temp L = Low Temp	1.5 to 7.6 HP	E = Ester Oil O = Mineral Oil					PFJ = 220V/240V- 1ph- 50 Hz TFD = 380V/420V- 3ph- 50 Hz TF5 = 200V/230V- 3ph- 60 Hz 200V/220V - 3ph - 50 Hz TF7=380 - 3ph - 60 Hz				Bill of Material		
Base Model								Electrical Code				Bill of Material		

## Bill of Material

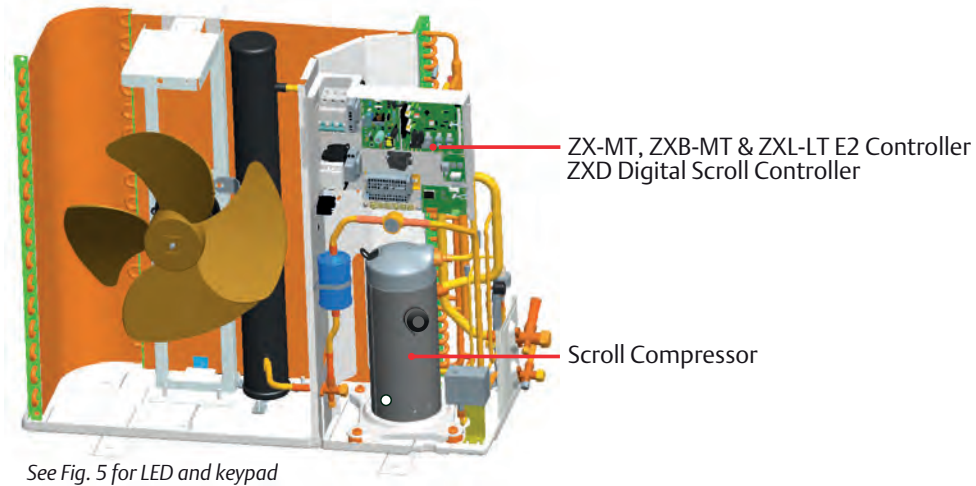
CDU Family	ZX			ZXB			ZXL				ZXD		
BOM	401	451	481	401	451	461	451	461	471	481	450	451	461
Liquid Line Filter Dryer/Sight Glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Oil Separator		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Accumulator							✓	✓	✓	✓			
Adjustable LP Switch	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Fixed LP Switch	✓	✓	✓								✓	✓	✓
E2 Controller	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Digital Scroll Controller											✓	✓	✓
Fan Speed Controller	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Intelligent Store Solution Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Circuit Breaker	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sound Jacket	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Low Ambient Kit			✓							✓			
Defrost Module	ACC	ACC		ACC	ACC	✓	ACC	✓	ACC				
Filter Drier									ACC				

Note: ACC- Accessory

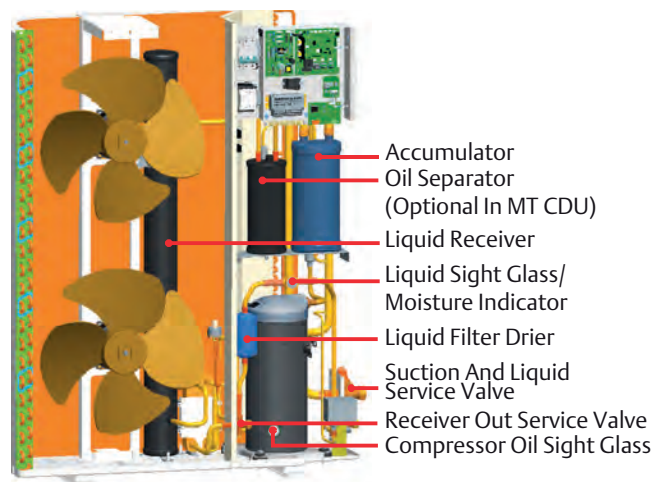


## Physical Layout of the Unit

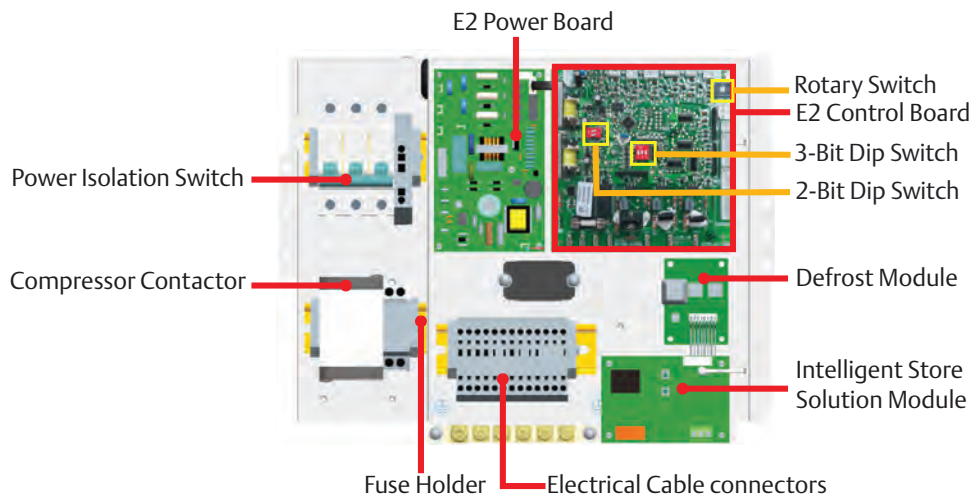
The following figures give an introduction to the physical layout of the ZX Platform CDU



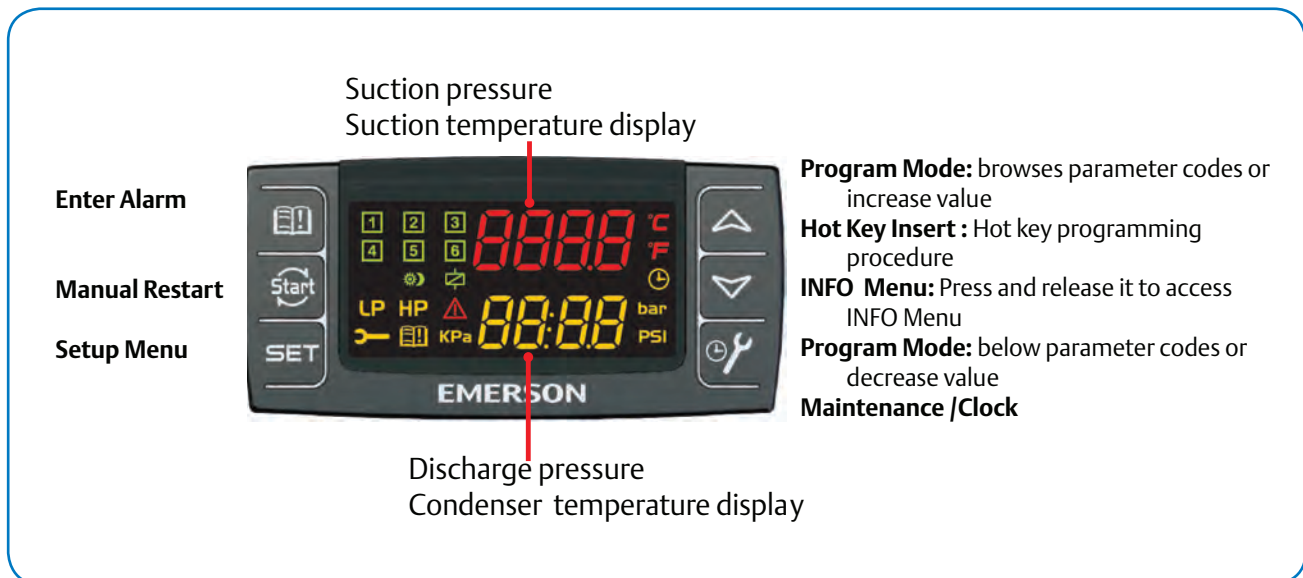
**Figure 2.** Identifies the Electronic controller assembly on a ZX platform CDU.



**Figure 3.** Identifies other major components layout on a ZX platform CDU.



**Figure 4.** Shows the layout of the E2 controller, electrical components, dip switches and rotary switch in the E2 control board.



**Figure 5.** Shows LED and keypad of ZXD digital scroll controller.

## Product Specification

For application envelope, envelope varies according to applications and refrigerants. Please refer to ZX platform product catalogue, product manual, or Copeland™ Brand Products Selection Software.

### Qualified Refrigerants and Oils

REFRIGERANT	OIL
R404A/R507/R134a	Emkarate RL 32 3MAF Mobil EAL Artic 22 CC
R22	Suniso 3GS

Oils are pre-charged in both compressor and oil separator. Total oil volume (liter) for each unit is shown in the table below:

ZX			ZXB		ZXD		ZXL	
Model	BOM		Model	BOM	Model	BOM	Model	BOM
	401	451		ALL		ALL		ALL
			ZXB015E	0.74				
ZX0200/E	1.18	1.68	ZXB020E	0.74			ZXL0200/E	1.06
ZX0250/E	1.33	1.83	ZXB025E	0.74			ZXL0250/E	1.06
ZX0300/E	1.33	1.83	ZXB030E	1.36			ZXL0300/E	1.06
			ZXB035E	1.36			ZXL0350/E	1.74
ZX0400/E	1.83	2.33	ZXB040E	1.36	ZXD0400/E	1.74	ZXL0400/E	1.74
ZX0500/E	1.83	2.33	ZXB050E	1.89	ZXD0500/E	2.27	ZXL0500/E	1.74
			ZXB055E	1.89				
ZX0600/E	1.66	2.16			ZXD0600/E	2.27	ZXL0600/E	2.27
ZX0750/E	1.66	2.16			ZXD0750/E	2.27	ZXL0750/E	2.27
ZX0760/E	1.66	2.16						

# E2 Control Board Dip Switch Setting (ZX-MT, ZXB-MT & ZXL-LT)

## ZX Model

Related Software Version 300-0043-02 V2.2	With Fan Speed Control		
Model	Rotary Switch	S2 Bit 3	S3 Bit1/ Bit2
ZX0200-TFD	1	OFF	ON/ON
ZX0300-TFD	2	OFF	ON/ON
ZX0400-TFD	3	OFF	ON/ON
ZX0500-TFD	4	OFF	ON/ON
ZX0600-TFD	5	OFF	ON/ON
ZX0750-TFD	6	OFF	ON/ON
ZX0760-TFD	6	OFF	ON/ON
ZX0200-PFJ	7	OFF	ON/ON
ZX0250-PFJ	8	OFF	ON/ON
ZX0300-PFJ	9	OFF	ON/ON
ZX0400-PFJ	A	OFF	OFF/OFF
ZX0200-TF5	1	ON	ON/ON
ZX0300-TF5	2	ON	ON/ON
ZX0400-TF5	3	ON	ON/ON
ZX0500-TF5	4	ON	OFF/OFF
ZX0600-TF5	5	ON	OFF/OFF
ZX0750-TF5	6	ON	OFF/OFF
ZX0200-TF7	7	ON	ON/ON
ZX0300-TF7	8	ON	ON/ON
ZX0400-TF7	9	ON	ON/ON
ZX0500-TF7 / ZX0600-TF7	A	ON	ON/ON
ZX0750-TF7	B	ON	ON/ON
Related Software Version 300-0043-03 V2.1	W/O Fan Speed Control		
Model	Rotary Switch	S2 Bit 3	S3 Bit1/ Bit2
ZX0200-TFD	1	OFF	ON/ON
ZX0300-TFD	2	OFF	ON/ON
ZX0400-TFD	3	OFF	ON/ON
ZX0500-TFD	4	OFF	ON/ON
ZX0600-TFD	5	OFF	ON/ON
ZX0750-TFD	6	OFF	ON/ON
ZX0200-PFJ	7	OFF	ON/ON
ZX0250-PFJ	8	OFF	ON/ON
ZX0300-PFJ	9	OFF	ON/ON
ZX0400-PFJ	A	OFF	OFF/OFF

## ZXB Model

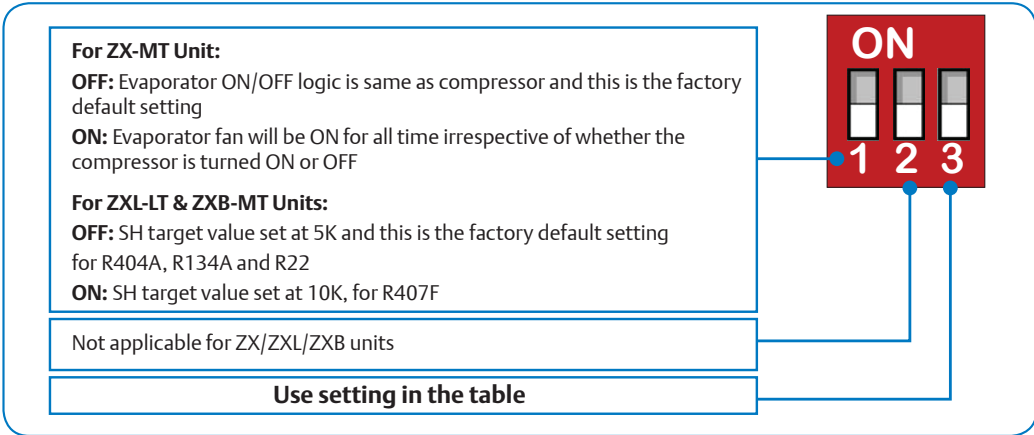
Related Software Version 300-0043-00 V2.2	With Fan Speed Control		
Model	Rotary Switch	S2 Bit 3	S3 Bit1/ Bit2
ZXB015E-TFD	1	OFF	ON/ON
ZXB020E-TFD	2	OFF	ON/ON
ZXB025E-TFD	3	OFF	ON/ON
ZXB030E-TFD	4	OFF	ON/ON

Related Software Version 300-0043-00 V2.2	With Fan Speed Control		
Model	Rotary Switch	S2 Bit 3	S3 Bit1/ Bit2
ZXB035E-TFD	5	OFF	ON/ON
ZXB040E-TFD	6	OFF	ON/ON
ZXB050E-TFD	7	OFF	ON/ON
ZXB055E-TFD	8	OFF	ON/ON

## ZXL Model

Related Software Version 300-0043-00 V2.2	With Fan Speed Control		
Model	Rotary Switch	S2 Bit 3	S3 Bit1/ Bit2
ZXL0200-TFD	1	OFF	ON/ON
ZXL0250-TFD	2	OFF	ON/ON
ZXL0300-TFD	3	OFF	ON/ON
ZXL0350-TFD	4	OFF	ON/ON
ZXL0400-TFD	5	OFF	ON/ON
ZXL0500-TFD	6	OFF	ON/ON
ZXL0600-TFD	7	OFF	ON/ON
ZXL0750-TFD	8	OFF	ON/ON
ZXL0200-TF5 / ZXL0250-TF5	1	ON	ON/ON
ZXL0300-TF5	2	ON	ON/ON
ZXL0350-TF5	3	ON	OFF/OFF
ZXL0400-TF5	4	ON	OFF/OFF
ZXL0500-TF5	5	ON	OFF/OFF
ZXL0600-TF5	6	ON	OFF/OFF
ZXL0750-TF5	7	ON	OFF/OFF
ZXL0200-TF7 / ZXL0250-TF7	8	ON	ON/ON
ZXL0300-TF7	9	ON	ON/ON
ZXL0350-TF7	A	ON	ON/ON
ZXL0400-TF7	B	ON	ON/ON
ZXL0500-TF7	C	ON	ON/ON
ZXL0600-TF7 / ZXL0750-TF7	D	ON	ON/ON
Related Software Version 300-0043-01 V2.0	W/O Fan Speed Control		
Model	Rotary Switch	S2 Bit 3	S3 Bit1/ Bit2
ZXL0200-TFD	1	OFF	ON/ON
ZXL0250-TFD	2	OFF	ON/ON
ZXL0300-TFD	3	OFF	ON/ON
ZXL0350-TFD	4	OFF	ON/ON
ZXL0400-TFD	5	OFF	ON/ON
ZXL0500-TFD	6	OFF	ON/ON
ZXL0600-TFD	7	OFF	ON/ON
ZXL0750-TFD	8	OFF	ON/ON

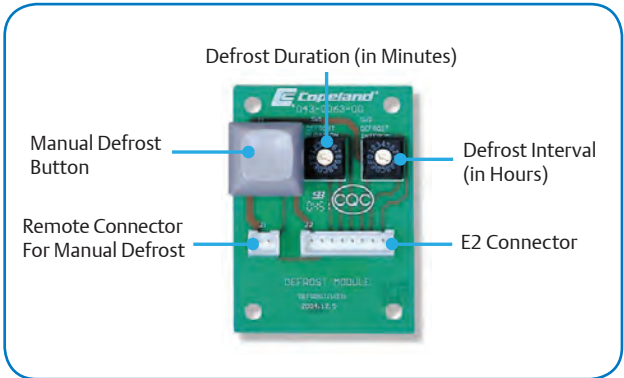




**Note:** The settings given in the table are pre-set at the factory for new units

## Defrost Module Function Set

Time of Defrost		Time of Defrost Interval	
Rotary Switch1	Time (min)	Rotary Switch2	Time (hours)
0	0	0	0
1	5	1	1
2	10	2	2
3	15	3	3
4	20	4	4
5	25	5	5
6	30	6	6
7	35	7	7



**Figure 6.** Defrost Module

## Digital Scroll Controller (ZXD)

The controller has been pre-programmed with a number of parameter values that are **set for typical application**. Individual installation requirements, however, may make it necessary to alter parameter settings. The control target of the digital scroll compressor controller is to maintain the suction pressure (or saturated suction temperature) at a defined value by varying the available compressor capacity. **The set-point can be altered using the SEtC parameter.** Factory setting SEtC is -6°C.

The control target of the fan speed controller is to maintain the average condenser mid-coil temperature and hence the average discharge pressure at a defined value. This is achieved by varying the fan speed. The set-point can be altered using the SEtF parameter. Factory setting SEtF is 25°C. Initial setting of set point for saturated suction temperature. Pre-set value is located in the SEtC position as shown in the diagram below:



**SET** Press for more than 2 seconds

or to change set value within 30 seconds

**SET** press to memorize new set value.

Then SEtF (fan speed control set point) will be displayed automatically.



Or to change set value within 30 seconds

**SET** press to memorize new value and Exit, or wait for 30 seconds without pressing any key to memorize value and exit.

# ZX CDU Intelligent Store Solution Module

ZX CDU address is determined using dip switches on the Intelligent Store Solution Module.

Switch numbers 1 to 6 set the slave address. Switch number 7 will set the Baud rate and switch number 8 will set the parity. The range of allowable addresses is 1 through 63. Refer to Dip Switch Address Settings table below.

Make sure that you are setting the same address, parity and baud rate as in the Dixell XWEB300D. Select “No Parity” and “9.6Kbps Baud Rate” on the ZX CDU Intelligent Store Solution Module.

Please note the termination JP3 jumper is just used for the devices at beginning or end of the daisy chain – any devices in the middle of the daisy chain do not need it.

JP3 Termination Jumper ON = Add 150  $\Omega$  resistor between A and B

JP3 Termination Jumper Off = Remove 150  $\Omega$  resistor between A and B

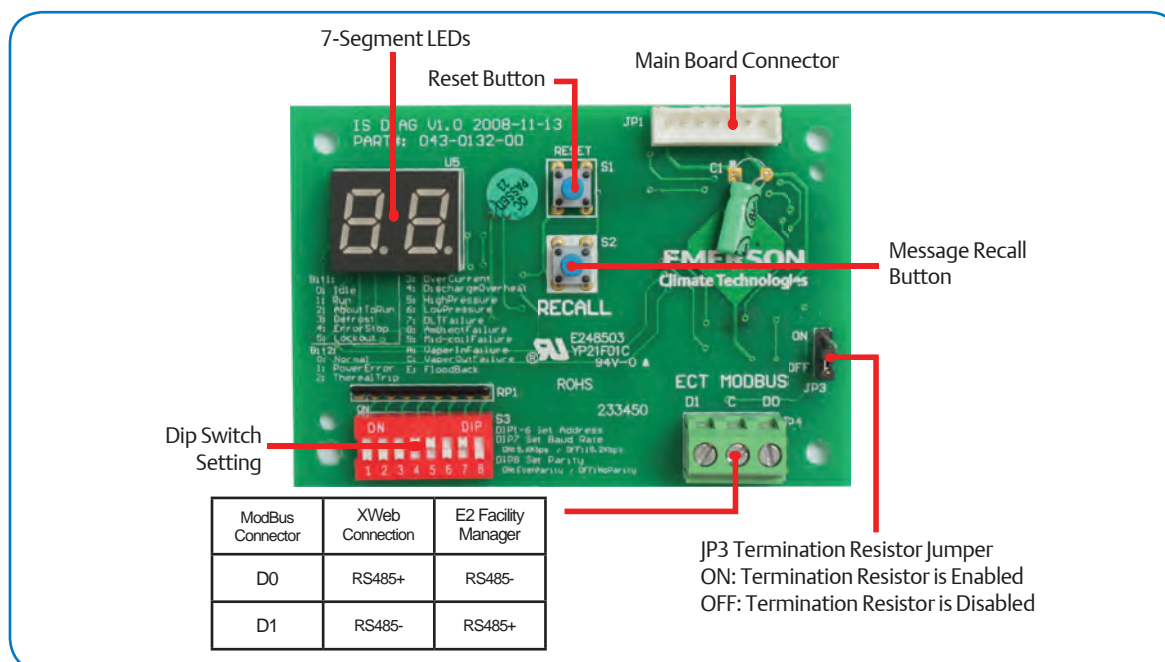



Figure 7. ZX CDU Intelligent Store Solution

## Dip Switch Address Settings

<div></div>				<div>•No. 1 to 6: Set Slave Address •No. 7: Set Baud Rate •No. 8: Set Parity</div>				
1	2	3	4	5	6	7	8	
Set Address								Address
OFF	OFF	OFF	OFF	OFF	ON	-	-	Address=1
OFF	OFF	OFF	OFF	ON	OFF	-	-	Address=2
OFF	OFF	OFF	OFF	ON	ON	-	-	Address=3
OFF	OFF	OFF	ON	OFF	OFF	-	-	Address=4
OFF	OFF	OFF	ON	OFF	ON	-	-	Address=5
OFF	OFF	OFF	ON	ON	OFF	-	-	Address=6
OFF	OFF	OFF	ON	ON	ON	-	-	Address=7
OFF	OFF	ON	OFF	OFF	OFF	-	-	Address=8
OFF	OFF	ON	OFF	OFF	ON	-	-	Address=9

1	2	3	4	5	6	7	8	
Set Address								Address
OFF	OFF	ON	OFF	ON	OFF	-	-	Address=10
OFF	OFF	ON	OFF	ON	ON	-	-	Address=11
OFF	OFF	ON	ON	OFF	OFF	-	-	Address=12
OFF	OFF	ON	ON	OFF	ON	-	-	Address=13
OFF	OFF	ON	ON	ON	OFF	-	-	Address=14
OFF	OFF	ON	ON	ON	ON	-	-	Address=15
OFF	ON	OFF	OFF	OFF	OFF	-	-	Address=16
OFF	ON	OFF	OFF	OFF	ON	-	-	Address=17
OFF	ON	OFF	OFF	ON	OFF	-	-	Address=18
OFF	ON	OFF	OFF	ON	ON	-	-	Address=19
OFF	ON	OFF	ON	OFF	OFF	-	-	Address=20
OFF	ON	OFF	ON	OFF	ON	-	-	Address=21
OFF	ON	OFF	ON	ON	OFF	-	-	Address=22
OFF	ON	OFF	ON	ON	ON	-	-	Address=23
OFF	ON	ON	OFF	OFF	OFF	-	-	Address=24
OFF	ON	ON	OFF	OFF	ON	-	-	Address=25
OFF	ON	ON	OFF	ON	OFF	-	-	Address=26
OFF	ON	ON	OFF	ON	ON	-	-	Address=27
OFF	ON	ON	ON	OFF	OFF	-	-	Address=28
OFF	ON	ON	ON	OFF	ON	-	-	Address=29
OFF	ON	ON	ON	ON	OFF	-	-	Address=30
OFF	ON	ON	ON	ON	ON	-	-	Address=31
ON	OFF	OFF	OFF	OFF	OFF	-	-	Address=32
ON	OFF	OFF	OFF	OFF	ON	-	-	Address=33
ON	OFF	OFF	OFF	ON	OFF	-	-	Address=34
ON	OFF	OFF	OFF	ON	ON	-	-	Address=35
ON	OFF	OFF	ON	OFF	OFF	-	-	Address=36
ON	OFF	OFF	ON	OFF	ON	-	-	Address=37
ON	OFF	OFF	ON	ON	OFF	-	-	Address=38
ON	OFF	OFF	ON	ON	ON	-	-	Address=39
ON	OFF	ON	OFF	OFF	OFF	-	-	Address=40
ON	OFF	ON	OFF	OFF	ON	-	-	Address=41
ON	OFF	ON	OFF	ON	OFF	-	-	Address=42
ON	OFF	ON	OFF	ON	ON	-	-	Address=43
ON	OFF	ON	ON	OFF	OFF	-	-	Address=44
ON	OFF	ON	ON	OFF	ON	-	-	Address=45
ON	OFF	ON	ON	ON	OFF	-	-	Address=46
ON	OFF	ON	ON	ON	ON	-	-	Address=47
ON	ON	OFF	OFF	OFF	OFF	-	-	Address=48
ON	ON	OFF	OFF	OFF	ON	-	-	Address=49
ON	ON	OFF	OFF	ON	OFF	-	-	Address=50
ON	ON	OFF	OFF	ON	ON	-	-	Address=51
ON	ON	OFF	ON	OFF	OFF	-	-	Address=52
ON	ON	OFF	ON	OFF	ON	-	-	Address=53
ON	ON	OFF	ON	ON	OFF	-	-	Address=54
ON	ON	OFF	ON	ON	ON	-	-	Address=55
ON	ON	ON	OFF	OFF	OFF	-	-	Address=56
ON	ON	ON	OFF	OFF	ON	-	-	Address=57

1	2	3	4	5	6	7	8	
Set Address								Address
ON	ON	ON	OFF	ON	OFF	-	-	Address=58
ON	ON	ON	OFF	ON	ON	-	-	Address=59
ON	ON	ON	ON	OFF	OFF	-	-	Address=60
ON	ON	ON	ON	OFF	ON	-	-	Address=61
ON	ON	ON	ON	ON	OFF	-	-	Address=62
ON	ON	ON	ON	ON	ON	-	-	Address=63
Set Baud Rate								Baud Rate
-	-	-	-	-	-	ON	-	9.6Kbps
-	-	-	-	-	-	-	OFF	19.2Kbps
Set Parity								Parity
-	-	-	-	-	-	ON	-	Even Parity
-	-	-	-	-	-	-	OFF	No Parity

## Network Wiring

### Dixell XWEB300D Serial Address

- Connect to the ModBUS network using cable with 2 or 3 shielded wires, minimum section 0.5mm<sup>2</sup> (e.g. BELDEN8772)
- Do not connect shield to ground.
- Do not connect the “Gnd” terminal.
- Remember to draw a map of the line. This will help you to find an error if something is wrong.
- RS485 devices are polarity sensitive.

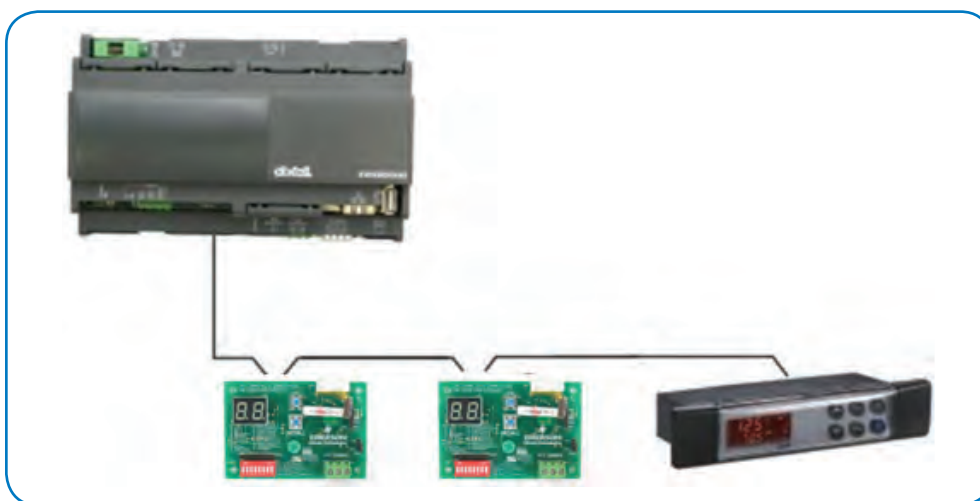


Figure 8. Correct Network Wiring

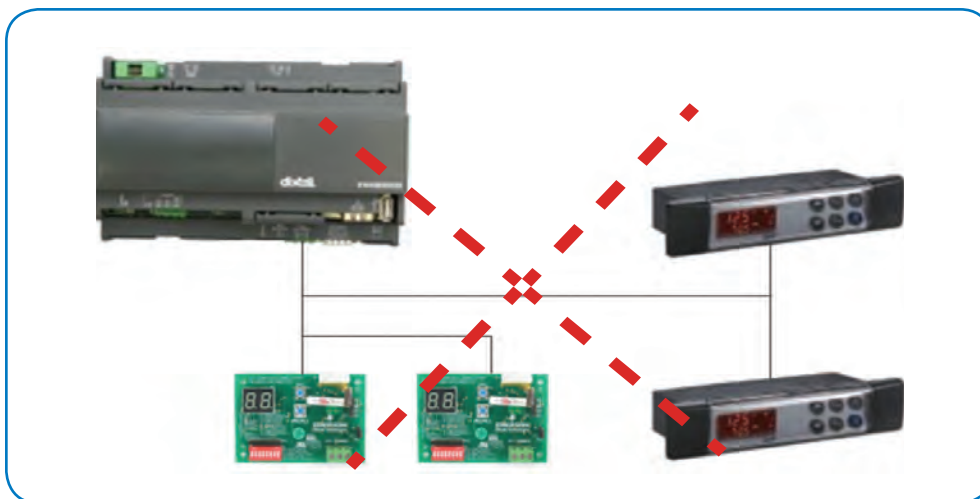


Figure 9. Incorrect Network Wiring

## Termination Resistor for XWEB300D

If XWEB300D is placed at the beginning or at the end of the line, please install its termination resistor by adding a jumper in position 2 (JMP2 on the back side of the unit). Do not add the jumper if XWEB300D is placed in the middle of the RS485 line.

## ZX CDU Connected to XWEB300D

ZX CDU connected to the Dixell XWEB300D with the Intelligent Store Solution Module using RS485 ModBUS.

Connect the ZX CDU to the ModBUS network as shown in Figure 9. Connect the network cable to the three-terminal connector on the XWEB300D port that has been configured as ModBUS port (COM 12, 13, 14).

Connect port “13” of XWEB300D to port “D0” of Intelligent Store Solution Module and port “12” of XWEB300D to port “D1” of Intelligent Store Solution Module for RS485 communication.

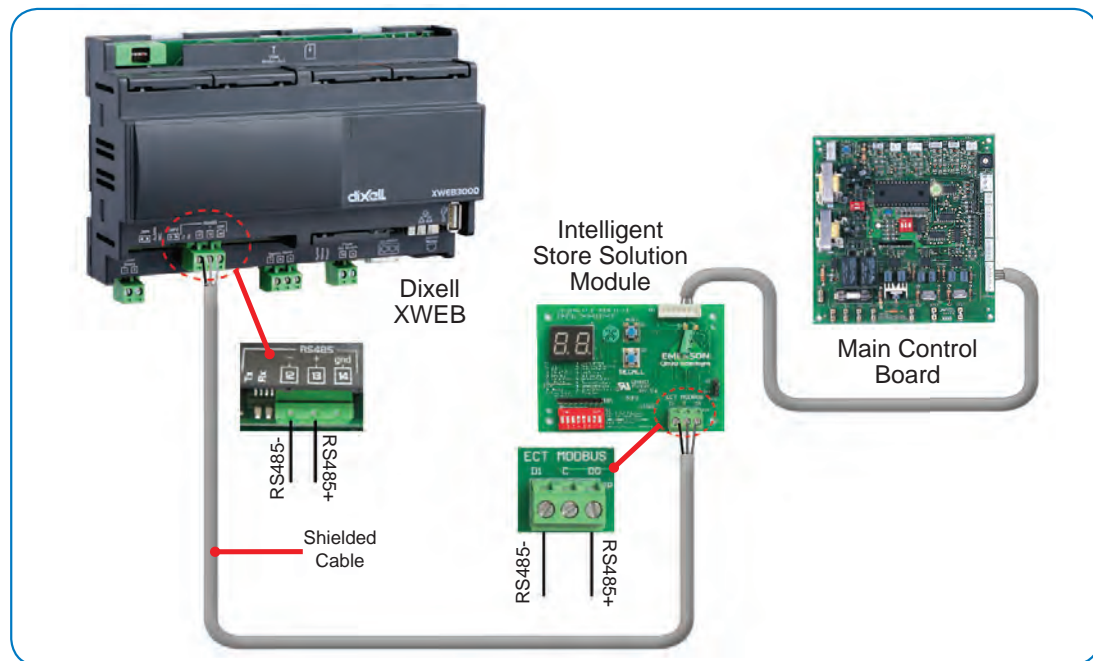


Figure 10. XWEB300D Connected to the Intelligent Store Solution Module

## Dixell XWEB300D Configuration

XWEB300D is compatible with ZX CDU firmware version 2.1.1 plus patch “Update\_CDU-UNITS\_(20121203)”.

Login into XWEB

- Go to Information → Information
- Check log update for “Update\_CDU-UNITS\_(20121203)”. If this is not present, follow the steps below.

Open Dixell website <http://www.dixell.com/xweb300d-xweb500-xweb500d/eng/>, then login (register required)

- Go to Support → System sw update → XWEB300D XWEB500 XWEB500D
- Download the upgrade package

With your web-browser, login into XWEB

- Go to Information → System Update menu

Provide the XW5 patch file

Once file has been selected wait until the upgrade procedure ends (XWEB reboots)

Verify the installation ended successfully by checking into the menu

- Go to Information → Information for “Update\_CDU-UNITS” string

Log in again and set up the ZX CDU

- Go to Configuration → Devices drop-down menu
- Go to Actions → New
- Enter device name in the Name field (e.g. ZX CDU)
- Select “ZXL-ECT\_001” in the Model field
- Enter the ModBUS address in the RS 485 address field
  - Refer to section “Dip Switch Address Settings”
- Click New

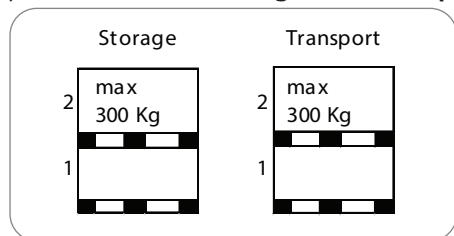
## Installation

Copeland ZX condensing units are delivered with a holding charge of neutral gas. The condensing unit should be located in such a place to prevent any dirt, plastic bag, leaves or papers from covering the condenser and its fins. The unit must be installed without restricting the airflow. A clogged condenser will increase the condensing temperature, thus reduce the cooling capacity, and lead to a high-pressure switch tripping. Clean the condenser fins on a regular basis.

## Condensing Unit Handling

### Transport and Storage

Move ZX/ZXB/ZXD/ZXL unit only with appropriate mechanical or handling equipment according to weight. Keep in the upright position. **Do not stack single boxes on top of each other without pallet in any case.** Keep the packaging dry at all times.



### Net Weight

ZX		ZXB		ZXD		ZXL	
Model	Weight (kg)	Model	Weight (kg)	Model	Weight (kg)	Model	Weight (kg)
ZX0200/E	76	ZXB015E	79	ZXD0400/E <sup>2</sup>	104	ZXL0200/E	79
ZX0250/E	79	ZXB020E	81	ZXD0500/E <sup>3</sup>	112	ZXL0250/E	81
ZX0300/E	79	ZXB025E	81	ZXD0600/E <sup>4</sup>	114	ZXL0300/E	81
ZX0400/E <sup>1</sup>	91	ZXB030E	93	ZXD0750/E <sup>5</sup>	122	ZXL0350/E	93
ZX0500/E	108	ZXB035E	93			ZXL0400/E	93
ZX0600/E	112	ZXB040E	106			ZXL0500/E	106
ZX0750/E	118	ZXB050E	116			ZXL0600/E	116
ZX0760/E	121	ZXB055E(TBD)	121			ZXL0750/E	121

#### Notes:

<sup>1</sup> 100 kg for models under 60 Hz TF5/7 and 50 Hz PFJ

<sup>2</sup> 109 kg for models under 60 Hz TF7

<sup>3</sup> 117 kg for models under 60 Hz TF7

<sup>4</sup> 121 kg for models under 60 Hz TF7

<sup>5</sup> 127 kg for models under 60 Hz TF7

## Electrical Connection

### Power supply

The ZX condensing unit electrical connection to the power supply must be made by qualified technicians, who should refer to the electrical diagrams located inside the electric connection panel. The units are designed for below power supply at  $\pm 10\%$  voltage tolerance. The circuit breaker must be switched off before opening the front panel.

Codes	HZ	Phase	Voltages
PFJ	50	1	220/240
TFD	50	3	380/420
TF7	60	3	380
TF5	60	3	200/230

### Electrical wiring

Before commissioning, ensure that neutral "N" wire is connected to the terminal block ("N" furthest to the right). After proper connection of the ZX condensing unit, the control LED on the power board and control board will light. For more details, see wiring diagram in Appendix.

**Caution!** Unit should be powered on at all times except during service. Failure to do so can result in component failure.



## Refrigeration Piping Installation

All interconnecting pipes should be of refrigeration grade, clean, dehydrated and must remain capped at both ends until installation. Even during installation, if the system is left for any reasonable period of time (say two hours), pipes should be re-capped to prevent moisture and contaminants from entering the system.

Do not assume that the service connection sizes on the unit (at the service valves) are the correct size to run your interconnecting refrigeration pipes. The service valve sizes have been selected for convenience of installation and in some cases (larger units) these may be considered too small. However for the very short pipe run within our units, these service connection sizes are adequate. All interconnecting pipes should be sized to satisfy the duty required.

Usually the suction line is insulated, but the liquid line is not. However the liquid line can pick up additional heat from the ambient and adversely affect the sub-cooling desirable for the liquid refrigerant before it enters the expansion valve.

The pipe should be sized to ensure optimum performance and good oil return. The sizing must also take into account the full capacity range through which this particular unit will need to operate.

Pipe runs should be kept as short as possible, using the minimum number of directional changes. Use large radius bends and avoid trapping of oil and refrigerant. This is particularly important for the suction line. The suction line should ideally slope gently towards the unit. Recommendation slope is 1/200~1/250. P traps, double risers and reduced pipe diameters may be required for suction lines where long vertical risers cannot be avoided. All pipes should be adequately supported to prevent sagging which can create oil traps. The recommended pipe clamp support distance is shown in the table.

Tube Size	Max distance between 2 clamp support
12.7mm (1/2 inch)	1.20 m
16.0mm (5/8 inch)	1.50 m
22.0mm (7/8 inch)	1.85 m
28.5mm (1 1/8 inch)	2.20 m

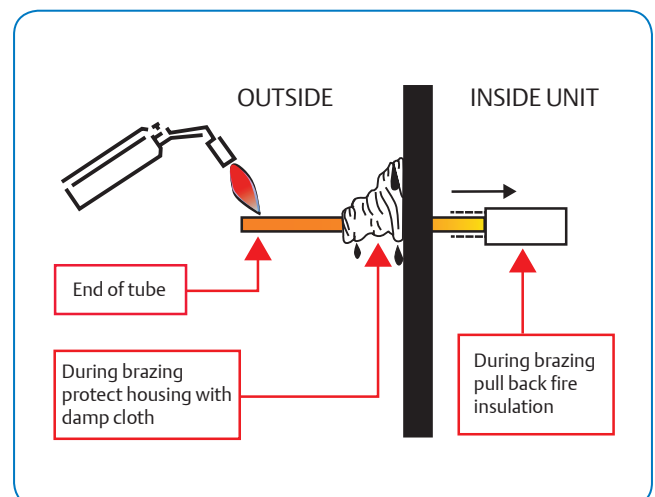
## ZXL liquid line insulation

ZXL liquid line should be insulated with a 19 mm insulation thickness. Temperature could be as low as  $-15^{\circ}\text{C}$ .

## Brazing recommendations

Maintain a flow of oxygen-free nitrogen through the system at a very low pressure during brazing. Nitrogen displaces the air and prevents the formation of copper oxides in the system. If copper oxidization is allowed to form, the copper oxide material can later be swept through the system and block screens such as those protecting capillary tubes, thermal expansion valves, and accumulator oil return holes. This minimizes any entry of contaminants and moisture.

- Remove the liquid line connection cap.
- Then remove the suction connection cap.
- Open both valves midway. Care should be taken to avoid the holding charge from releasing too quickly.
- Be sure tube fitting inner diameter and tube outer diameter are clean prior to assembly.
- Since both tubes are extended from the condensing unit housing, we recommend insulating the housing by using a wet cloth on the copper tubing.
- Recommended brazing materials: a copper / phosphorous or copper / phosphorous / silver alloy rod should be used for joining copper to copper whereas to join dissimilar or ferric metals, use a silver alloy rod, either flux coated or with a separate.
- Use a double tip torch.



## Expansion Valve Selection for Low Ambient Application

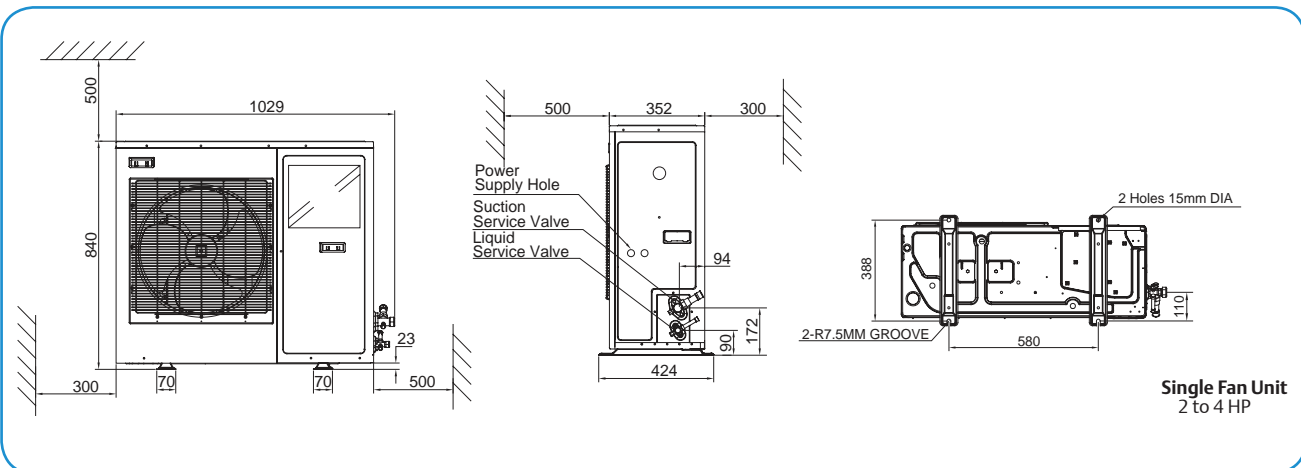
For systems expected to operate in varying ambient conditions – namely summer and winter temperatures – the expansion valve (TXV or EXV) sizing should take into consideration the maximum expected saturated condensing temperature at high ambient conditions (summer) and the minimum expected saturated condensing temperature, set at -25°C, during low ambient conditions (winter).

The chosen expansion valve's operating capacities should be well within these limits to ensure satisfactory system performance.

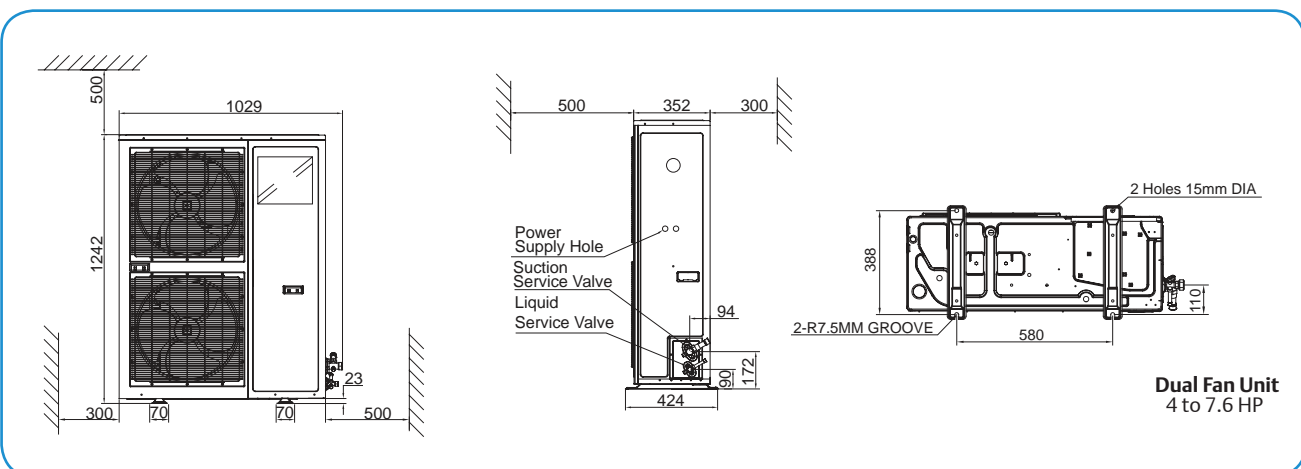
In the event that different expansion valves come up for the two conditions, the valve for low ambient condition should be selected. This means that at higher ambient, the valve will be oversized. However, if the valve at the high ambient is selected, it may be too small during low ambient condition.

## Location and Fixing

The unit should always be installed in a location that ensures clean air flow. It is recommended that a clearance of 300 mm from the wall (or the next unit) be maintained from the unit's left and rear panels whereas a clearance of 500 mm must be maintained from the unit's right, top and front panels (seen facing the front of the unit). Both service access and airflow have been considered in making these recommendations. Where multiple units are to be installed in the same location, the contractor needs to consider each individual case carefully. There can be many variations of unit quantities and available space and it is not the intention of this manual to go over these. Ideally, the unit should be mounted on a solid concrete slab with anti-vibration pads between unit feet and concrete. However the ZX condensing unit has also been designed for wall mounting on suitable brackets. Wall mounting brackets are not included. Another factor to consider in finding a good installation site is the direction of the prevailing wind. For example if the air leaving the condenser faces the prevailing wind, the air flow through the condenser can be impeded, causing high condensing temperatures ultimately resulting in reducing unit life. A baffle is a remedy for this situation.



Fixing dimensions and distances - Single fan unit



Fixing dimensions and distances - Dual fan unit

# Start Up and Operation

Before commissioning, ensure that all valves on the condensing unit are fully opened.

## Evacuation

The evacuation procedure is based upon achieving an actual system vacuum standard and is not time dependent. Before the installation is put into commission, it has to be evacuated with a vacuum pump. Proper evacuation reduces residual moisture to 50ppm. The installation of adequately sized access valves at the furthest point from the compressor in the suction and liquid lines is advisable. To achieve undisturbed operation, the compressor valves are closed and the system is evacuated down to 0.3 mbar / 0.225 Torr. Pressure must be measured using a vacuum pressure (Torr) gauge on the access valves and not on the vacuum pump; this serves to avoid incorrect measurements resulting from the pressure gradient along the connecting lines to the pump.

## Charging Procedure

### Refrigerant charging procedure

The scroll compressor design requires system charging as quickly as possible with liquid refrigerant into the liquid line. This will avoid running the compressor under conditions where there is insufficient suction gas. Sufficient suction gas is available to cool not only the motor but also the scrolls. Temperature builds up very quickly in the scrolls if this is not done. Do not charge vapor (gas) refrigerant into the ZX Scroll unit. The suction service valve must not be fully closed at any time while the compressor is running. To do so would cause damage to the compressor in the same manner as explained above. This valve is provided for ease of connection and for the fitting of service gauges without removing the unit panel. It is recommended to charge the ZX unit with refrigerant via its service valves. It is recommended to break the vacuum in the system with a partial charge of the refrigerant, before starting the system. For charge adjustment, it is recommended to check the liquid sight glass just before the expansion valve.

### Oil charging procedure

Emerson ZX condensing units are supplied only with a compressor oil charge. After commissioning, the oil level should be checked and topped up if necessary. The oil level should be approximately halfway up the sight glass (ZXL/ZXD units). Oil can be charged through the Schraeder valve on suction valve.

### Scroll compressor rotation direction

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. The direction of rotation is not an issue with single-phase compressors since they will always start and run in the proper direction. Three-phase compressors will rotate in either direction depending upon the phasing of the power. Since there is a 50-50 chance of connecting power in such a way that causes rotation in the reverse direction, it is important to include notices and instructions in appropriate locations on the equipment to ensure proper rotation direction when the system is installed and operated.

### Maximum compressor cycle

Maximum permitted starts per hour is 10.

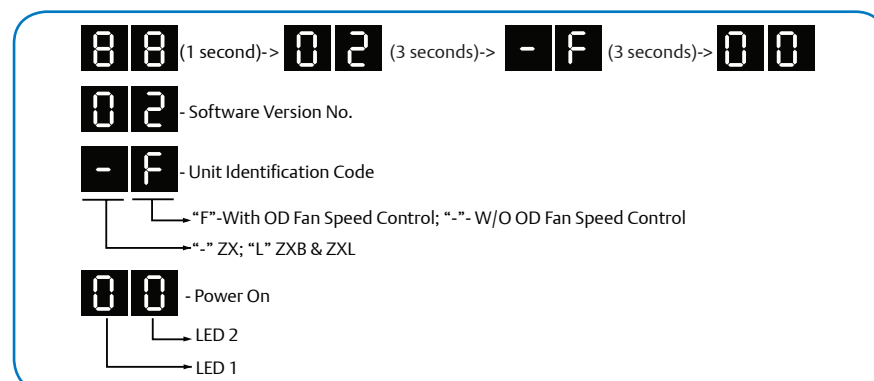
### Check before starting & during operation

Both valves should be fully opened on the liquid line, in order to prevent trapping liquid.

- Check that all valves are fully opened.
- After starting and operation conditions are stabilized, it is recommended to check the oil level in compressor(s) and see if there is a need to add oil to ensure a sufficient oil level (halfway up the sight glass).

## Diagnostic Initialization Message (ZX-MT, ZXB-MT and ZXL-LT)

When the unit is initially powered on, the diagnostic module will show the following signals.





## Diagnostic Messaging - LED Definition (ZX-MT, ZXB-MT and ZXL-LT)

LED1-Unit Status		LED2-Error/Warning Code		Display Warning Signal	Controller Pause Unit Automatic Reset	Controller Lock Unit Manual Reset
Display	Status	Display	Error/Warning			
0	Idle (Stop When Reach To Set-point)	0	No error/warning			
1	Run	1	Compressor Phase Error (Wrong Phase Sequence/Loss of Phase)	Every Protection Action	Every Protection Action	NA
2	About To Start ①	2	Compressor Inside Thermal Protector Trip	Every Protection Action	NA	NA
3	Defrost	3	Compressor Over Current	Every Protection Action	<5 times Protection In 1 Hour	6th Protection In 1 Hour
4	Stop Due to Error	4	Overheat	Every Protection Action	ZX: <3 times Protection In 1 Hour ZXL: Every Protection	ZX: <4th Protection In 1 Hour ZXL: NA
5	Lockout	5	Compressor High Pressure Cut Out	Every Protection Action	<5 times Protection In 1 Hour	6th Protection In 1 Hour
		6	Compressor Low Pressure Cut Out ②	Every Protection Action	Every Protection	NA
		7	DLT Thermistors Failure	Every Protection Action	<5 times Protection In 1 Hour	NA
		8	Ambient Temperature Sensor Failure	Every Protection Action	NA	NA
		9	Mid-coil Temperature Sensor Failure	Every Protection Action	NA	NA
		A	PHE Vapor In Temperature Sensor Failure or Over Range ③	Every Protection Action	NA	NA
		C	PHE Vapor Out Temperature Sensor Failure or Over Range ③	Every Protection Action	NA	NA
		E	System Liquid Flood Back Warning	~20% Liquid Back	NA	NA

### Notes:

- ① New start, normal start by program and any start request delay  
 ② "LP Cutout" signal is not applicable in ZXL condensing unit.  
 ③ PHE Vapor In/Out temperature sensor is not applicable in ZX medium temperature condensing unit.

## Alarm Messaging - Digital Scroll Controller (ZXD)

Alarm Mode	Set Points	Controller Actions	Reset	Remarks
dLt	DLT ≥ dLt after dLt time delay	- Compressors are turned off	Auto reset when DLT < dLt-dLH	DLT
E01L	Low pressure is lower than ELP (Level 3 Parameter)	- Compressors are turned off - Fans are unchanged	Auto reset when LP ≥ ELP (Level 3)	LP
EOL	Mechanical LP switch opens	- Compressors are turned off - Fans are unchanged	Auto reset when Number of activations < PEn in PEi time	LP
			Manual reset when Number of activations ≥ PEn in PEi time - Press  key for 3 sec or - Turn off and on the unit	LP
G-LA	LP < LAL	- Signaling only	Auto reset when LP = LAL + delta (0.3bar)	LP
G-HA	LP ≥ HAL	- Signaling only	Auto reset when LP = HAL - delta (0.3bar)	LP
EOH	Mechanical HP switch opens	- Compressors are turned off - Fans are turned on	Auto reset when Number of activations < PEn in PEi time	HP
			Manual reset when Number of activations ≥ PEn in PEi time - Press  key for 3 sec or - Turn off and on the unit	HP
F-HA	HP ≥ HAF	- HFC = yes, compressor are turned off	Auto reset when HAF + delta (0.3bar)	Cond Mid Temp.
P1	Suction Transducer failure or out of range	- Compressors are activated according to SP or PoPr	Auto reset when probe is normal	LP
P2	Condenser Mid Coil Sensor failure or out of range	- Fans are activated according to FPr	Auto reset when probe is normal	Cond Mid Temp.
P3	Discharge Temp Sensor failure or out of range	- The functions related to No.3 probe are disabled	Auto reset when probe is normal	DLT

DLT: Discharge line temperature

LP: Low pressure

HP: High pressure

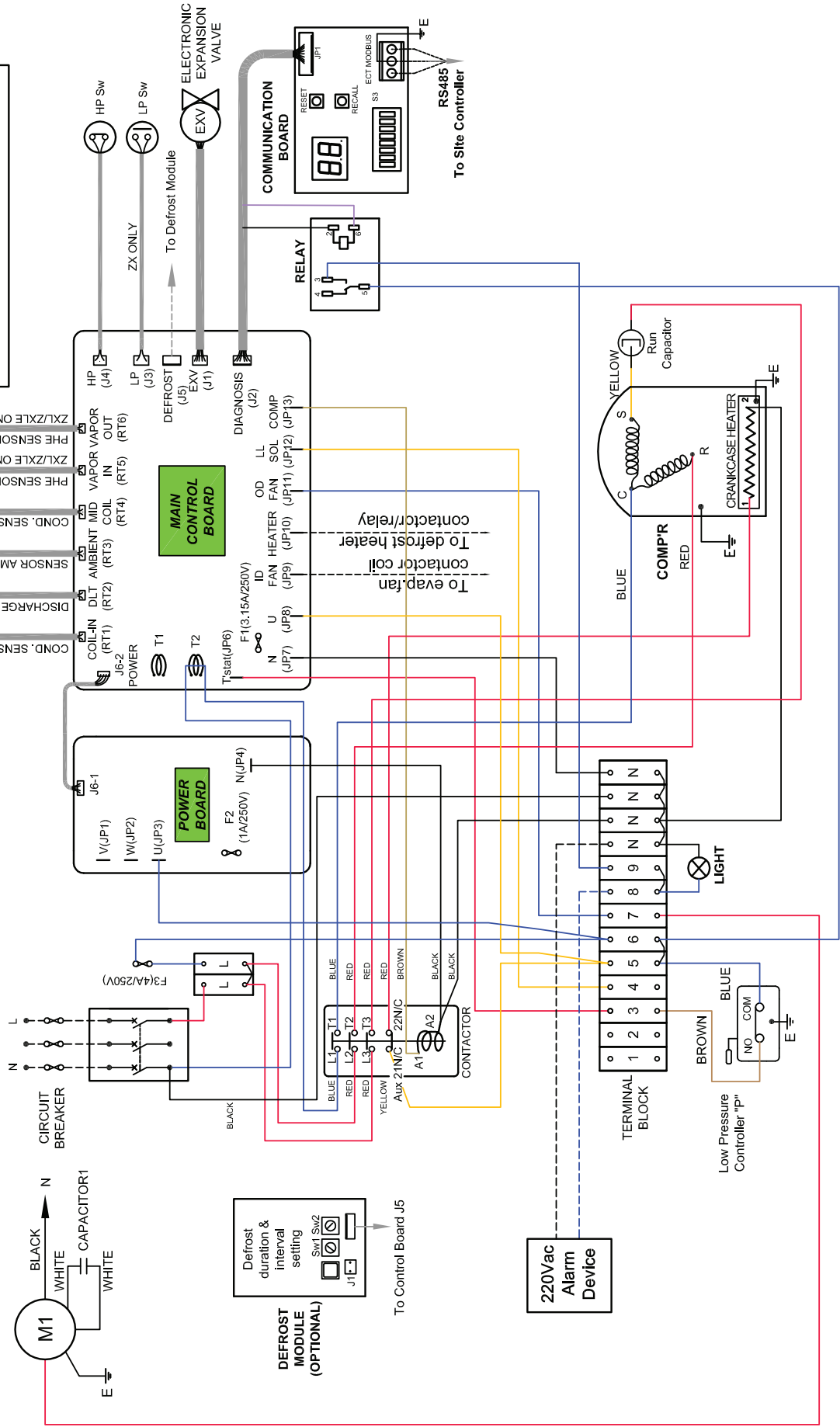
# ZX/ZXL Condensing Unit Wiring Diagram

PFJ: 220V-50 Hz -1Ph

**ATTENTION:** Unit **MUST** be grounded!

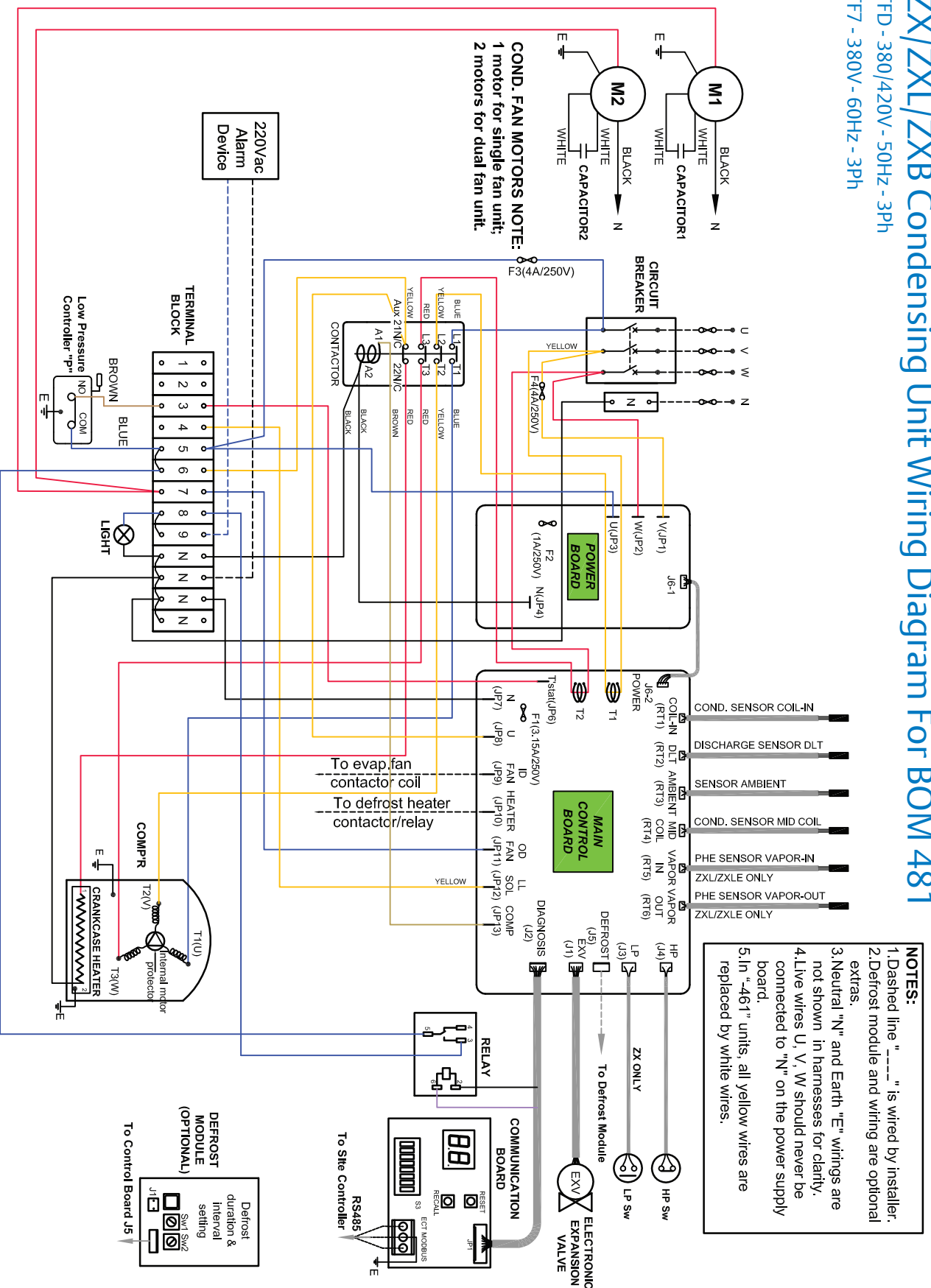
## NOTES:

1. Dashed line "----" is wired by installer.
2. Defrost module and wiring are optional extras.
3. Earth "E" wirings are not shown in harnesses for clarity.



# ZX/ZXL/ZXB Condensing Unit Wiring Diagram For BOM 481

TFD - 380/420V - 50Hz - 3Ph  
TF7 - 380V - 60Hz - 3Ph





# ZX/ZXL Condensing Unit Wiring Diagram

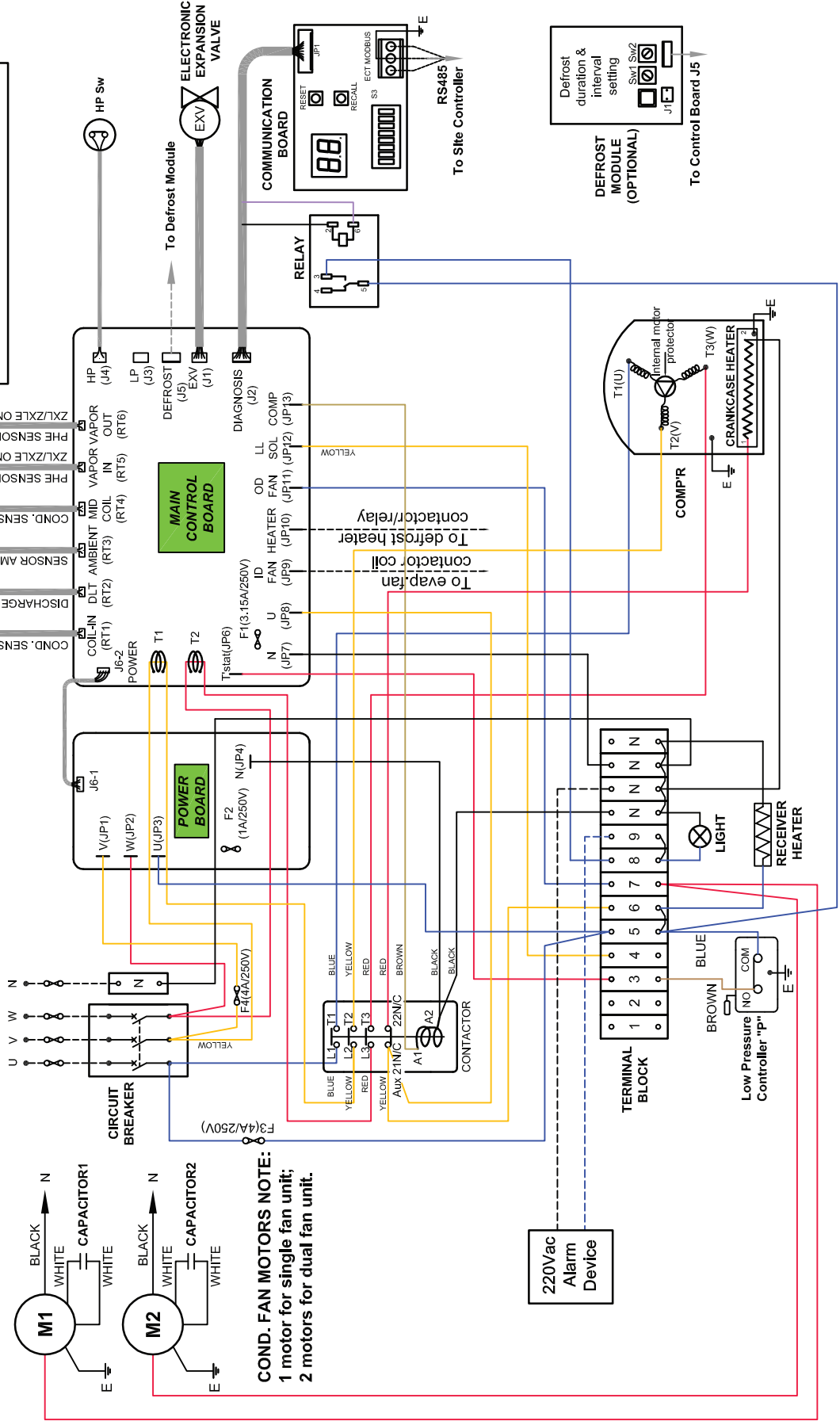
TFD: 380/420V - 50Hz - 3Ph

TF7: 380V - 60Hz - 3Ph

**ATTENTION: Unit MUST be grounded!**

## NOTES:

1. Dashed line "----" is wired by installer.
2. Defrost module and wiring are optional extras.
3. Neutral "N" and Earth "E" wirings are not shown in harnesses for clarity.
4. Live wires U, V, W should never be connected to "N" on the power supply board.



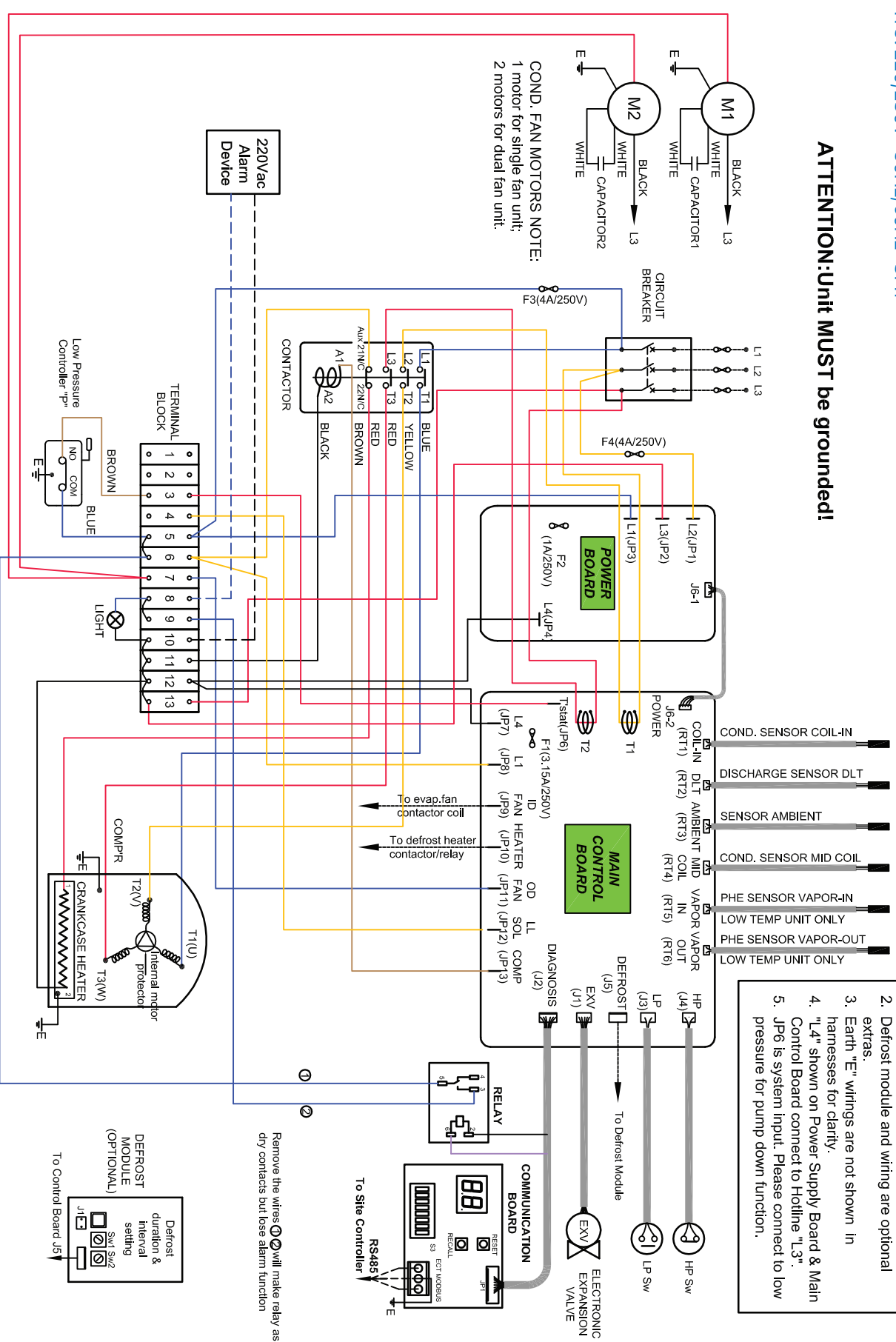
**COND. FAN MOTORS NOTE:**  
1 motor for single fan unit;  
2 motors for dual fan unit.

# ZX/ZXL Condensing Unit Wiring Diagram

TF5: 220/230V - 50Hz/60Hz - 3Ph

**ATTENTION: Unit MUST be grounded!**

**COND. FAN MOTORS NOTE:**  
1 motor for single fan unit;  
2 motors for dual fan unit.



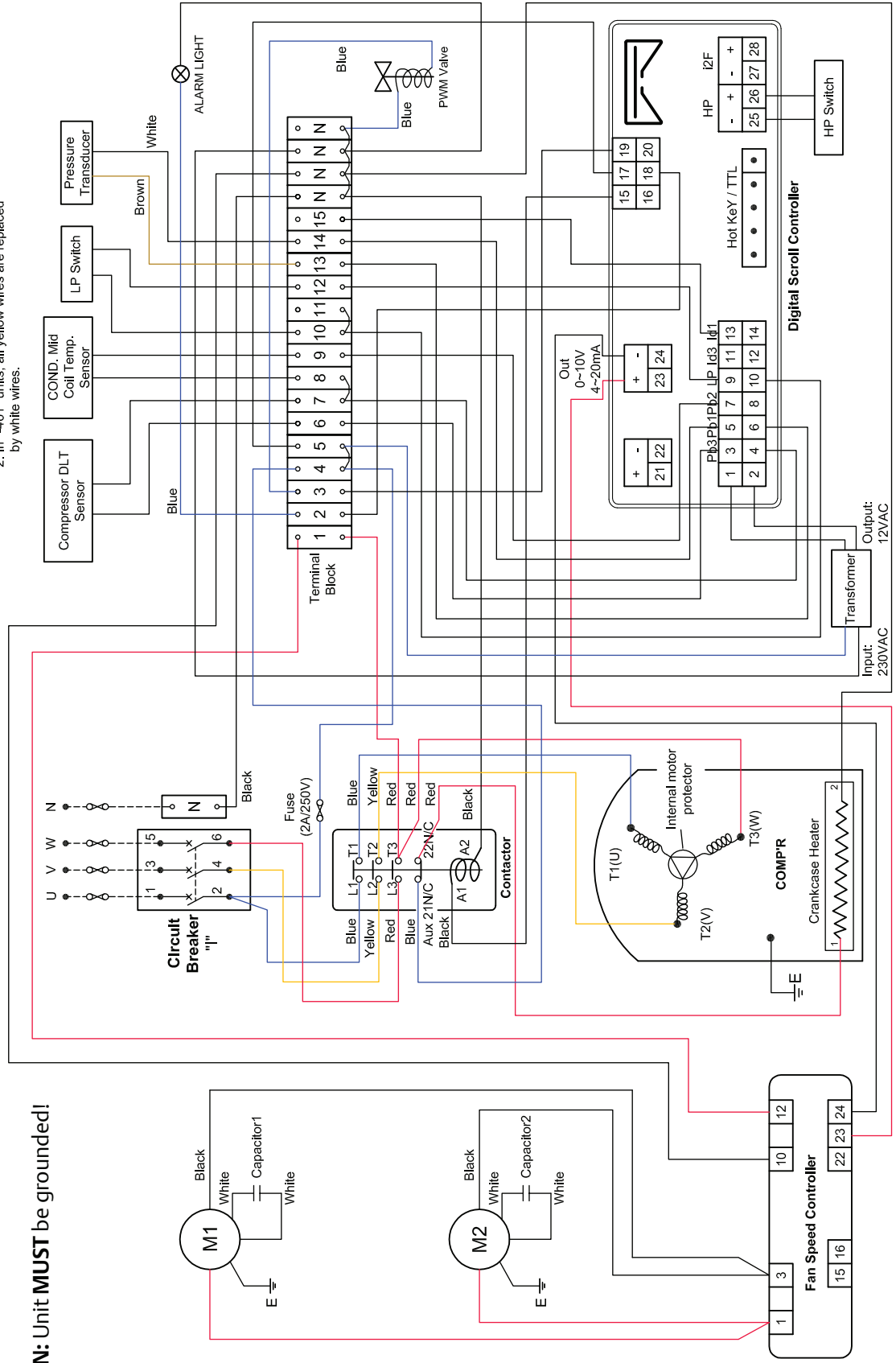
# ZXD Condensing Unit Wiring Diagram (With Fan Speed Control Function)

R22 TFD: 380V/420V - 50Hz - 3Ph

**ATTENTION:** Unit **MUST** be grounded!

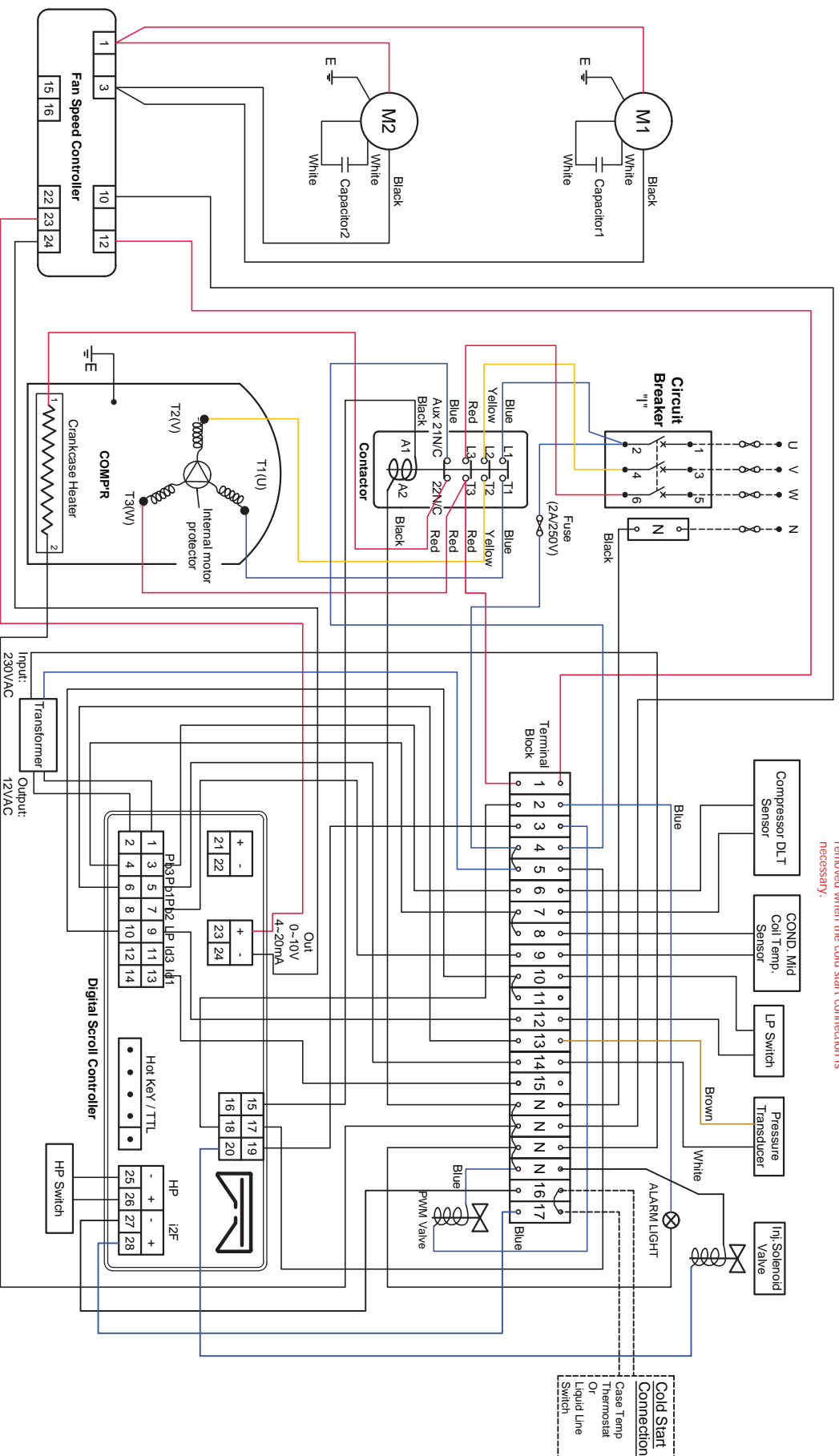
**ATTENTION:** Unit **MUST** be grounded!

- Notes:**
1. Dashed line "-----" is wired by installer.
  2. In "461" units, all yellow wires are replaced by white wires.



# ZXD Condensing Unit Wiring Diagram (With Fan Speed Control Function)

R22 TF7: 380V-60Hz-3Ph



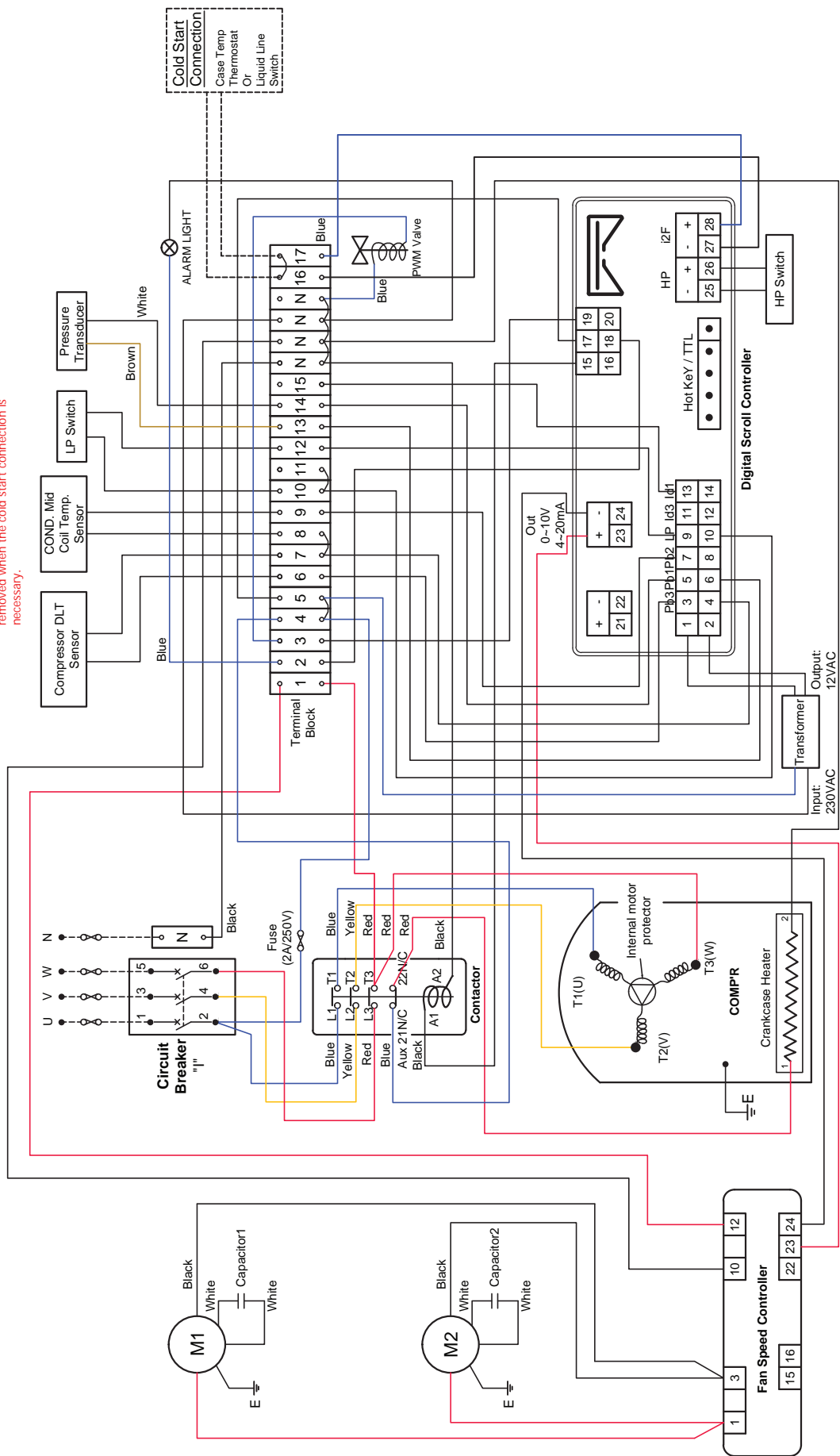
# ZXD Condensing Unit Wiring Diagram (With Fan Speed Control Function)

R404A TF7: 380V-60Hz-3Ph

ATTENTION: Unit MUST be grounded!

Notes:

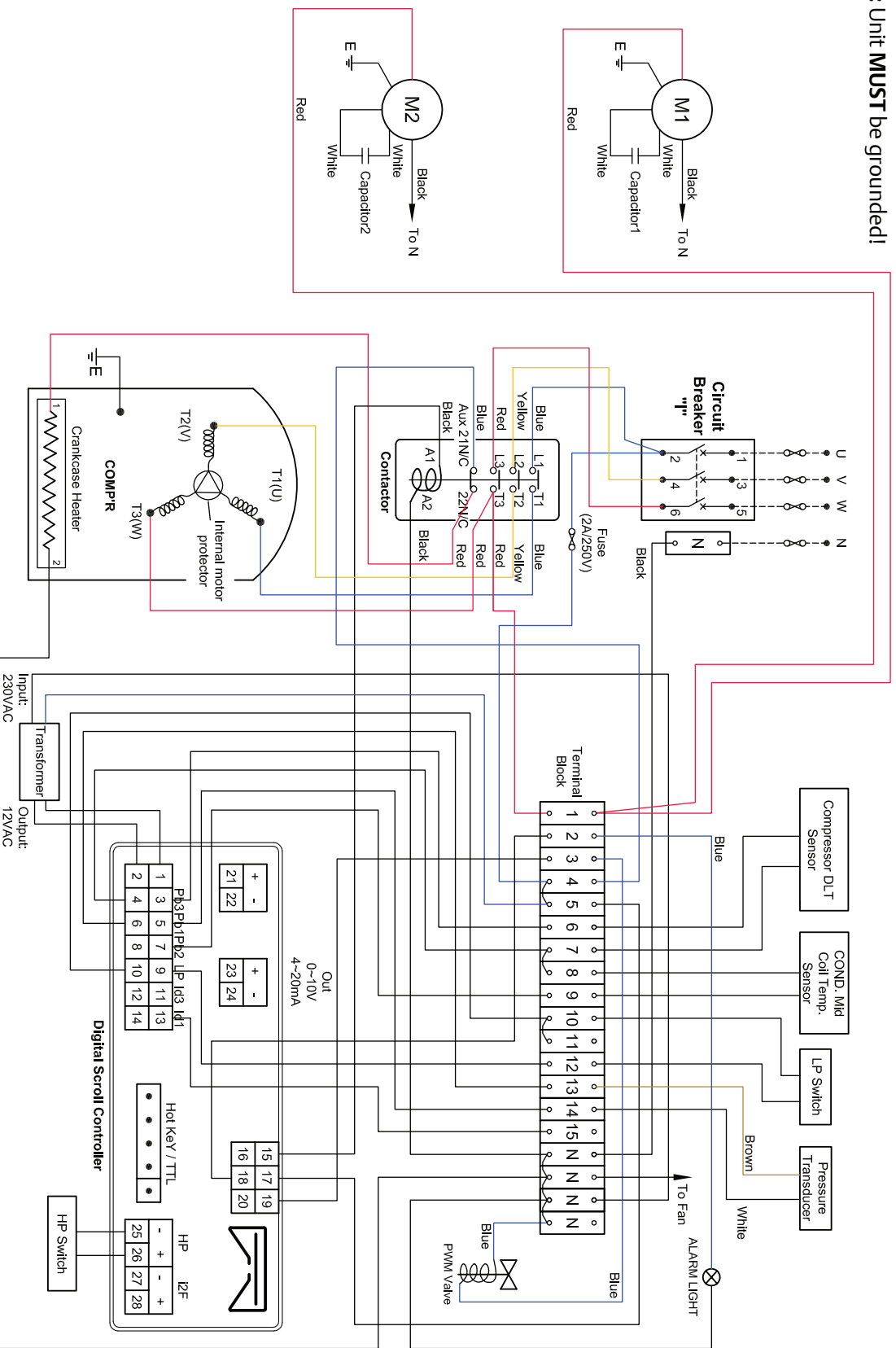
1. Dashed line "----" is wired by installer.
2. The connector-jumper (#16 & #17) must be removed when the cold start connection is necessary.



# ZXD Condensing Unit Wiring Diagram (Without Fan Speed Control Function)

TFD: 380V/420V-50Hz-3Ph

**ATTENTION:** Unit **MUST** be grounded!



**ATTENTION:** Unit **MUST** be grounded!

Note:  
Dashed line "----" is wired by installer.



## General Information

Technical data are correct at the time of printing. Updates may occur, and should you need confirmation of a specific value, please contact Emerson Climate Technologies stating clearly the information required.

Emerson Climate Technologies cannot be held responsible for errors in capacities, dimensions, etc., stated herein. Products, specifications, and data in this literature are subject to change without notice.

The information given herein is based on data and tests which Emerson Climate Technologies believes to be reliable and which are in accordance with today's technical knowledge. It is intended for use by persons having the appropriate technical knowledge and skill, at their own discretion and risk. Our products are designed and adapted for fixed locations. For mobile applications, failures may occur.

The suitability for this has to be assured from the plant manufacturer, which may include making appropriate tests.

### Note:

The components listed in this catalogue are not released for use with caustic, poisonous or flammable substances. Emerson Climate Technologies cannot be held responsible for any damage caused by using these substances.

# Contact Lists

## Asia Pacific Headquarters

Emerson Climate Technologies  
Suite No. 2503-8, 25/F,  
Exchange Tower, 33 Wang Chiu Road,  
Kowloon Bay, Kowloon, Hong Kong  
Tel: (852) 2866 3108  
Fax: (852) 2520 6227

## Australia

Emerson Climate Technologies Australia  
Pty Ltd  
356 Chisholm Road  
Auburn NSW 2144, Australia  
Tel: (612) 9795 2800  
Fax: (612) 9738 1699

## China - Beijing

Emerson Climate Technologies (Suzhou)  
Co. Ltd  
Beijing Sales Office  
Room 1017 JianWei Building,  
66 Nan Lishi Road, XiCheng District,  
Beijing, PRC  
Tel: (8610) 5763 0488  
Fax: (8610) 5763 0499

## China - Guangzhou

Emerson Climate Technologies (Suzhou)  
Co. Ltd  
Guangzhou Sales Office  
508-509 R&F Yinglong Plaza,  
No. 76 Huangpu Road West,  
Guangzhou, PRC  
Tel: (8620) 2886 7668  
Fax: (8620) 2886 7622

## China - Shanghai

Emerson Climate Technologies  
(Suzhou) Co. Ltd  
Shanghai Sales Office  
1801 Building B, New CaoHeJing  
International Business Center,  
391Guiping Rd, Shanghai, PRC  
Tel: (8621) 3418 3968

## India - Mumbai

Emerson Climate Technologies (India) Ltd  
Delphi B-Wing, 601-602, 6th Floor  
Central Avenue, Hiranandani Business Park,  
Powai, Mumbai 400076  
Tel: (9122) 2500 6630 / 2500 6632  
Fax: (9122) 2500 6570

## India - PUNE

Emerson Climate Technologies (India) Ltd  
Plot No. 23, Rajiv Gandhi Infotech Park,  
Phase - II, Hinjewadi,  
Pune 411 057, Maharashtra, India  
Tel: (9120) 2553 4988  
Fax: (9120) 2553 6350

## Indonesia

PT Emerson Indonesia  
Wisma 46 - Kota BNI, 16th Floor, Suite 16.01,  
Jl. Jend.Sudirman Kav.1.  
Jakarta 10220, Indonesia  
Tel: (6221) 2513003  
Fax: (6221) 2510622

## Japan

Emerson Japan Ltd  
Shin-yokohama Tosho Building  
No. 3-9-5 Shin-Yokohama, Kohoku-ku  
Yokohama 222-0033 Japan  
Tel: (8145) 475 6371  
Fax: (8145) 475 3565

## Malaysia

Emerson Electric (Malaysia) Sdn. Bhd.  
Level M2, Blk A, Menara PKNS-PJ  
Jalan Yong Shook Lin  
46050 Petaling Jaya, Selangor, Malaysia  
Tel: (603) 7949 9222  
Fax: (603) 7949 9333

## Middle East & Africa

Emerson Climate Technologies  
PO Box 26382  
Jebel Ali Free Zone – South  
Dubai, UAE  
Tel: (9714) 811 8100  
Fax: (9714) 886 5465

## Philippines

Emerson Climate Technologies  
23rd Floor San Miguel Properties Centre  
#7 St. Francis Street, Ortigas Center,  
Mandaluyong City, Philippines  
Tel: (632) 689 7200

## South Korea

Emerson Electric Korea Ltd.  
3F POBA Gangnam Tower, 119 Nonhyun-  
Dong, Gangnam-Gu, Seoul 135-010 Korea  
Tel: (822) 3483 1500  
Fax: (822) 592 7883

## Taiwan

Emerson Electric (Taiwan) Co. Ltd  
3F No. 2 DunHua South Road Sec.1,  
Taipei (105), Taiwan  
Tel: (8862) 8161 7688  
Fax: (8862) 81617614

## Thailand - Bangkok

Emerson Electric (Thailand) Ltd  
34th Floor, TCIF Tower,  
1858/133, Bangna Trad,  
Bangkok 10260, Thailand  
Tel: (662) 716 4700  
Fax: (662) 751 4241

## Vietnam

Emerson Climate Technologies - Vietnam  
Suite 307-308,  
123 Truong Dinh St., Dist.3  
Ho Chi Minh, Vietnam  
Tel: (84) 908 009 189

**EmersonClimateAsia.com**

Asia 02 A01 10 – R01 Issued 08/2014 – GSCAA001

Emerson and Copeland Scroll are trademarks of Emerson Electric Co. or one of its affiliated companies.  
©2014 Emerson Climate Technologies, Inc. All rights reserved.

**EMERSON. CONSIDER IT SOLVED.™**